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ABSTRACT

Over 1,000 eighth grade students participated in a study to determine the relationships between learning style and reading/language arts skills as demonstrated by standardized testing. It was hypothesized that (1) individual learning style contributes significantly to reading and communication skills, (2) specific learning style elements acting together account for a significant amount of variance in reading and communication skills, and (3) no significant differences exist between sexes, races, and socioeconomic levels in preferences for learning style elements. Subjects were administered the Learning Style Inventory (LSI) and the Comprehensive Test of Basic Skills (CTBS). Demographic date were gathered from the subjects' school enrollment records. The results supported the first and second hypotheses. Levels indicated that individual learning style accounts for 16% of the variance in reading and language arts skills. For reading skills, the most critical elements were persistence, adult motivation, authority figures not present, and intake. For language arts skills, the same four elements were identified as the most critical, but in a slightly different order. Hypothesis three was not supported: significant differences appeared in learning styles between boys and girls, among White, Black, and Hispanic students, and among the three predetermined socioeconomic levels. (Appendixes contain a chart of learning style elements, a description of the LSI, and a sample profile.) (HTH)

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# THE EFFECTS OF LEARNING STYLE ON READING AND LANGUAGE ARTS AND DIFFERENCES IN LEARNING STYLE AMONG GROUPS OF EIGHTH GRADE STUDENTS

a paper

presented at the

annual meeting of

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# THE EFFECTS OF LEARNING STYLE ON READING AND LANGUAGE ARTS AND DIFFERENCES IN LEARNING STYLE AMONG GROUPS OF EIGHTH GRADE STUDENTS

## INTRODUCTION

The purpose of this first of a two part study is to establish the relationships, if any, between individual learning style and reading/language arts skills in eighth grade students as demonstrated by standardized testing. Two critical questions, demanding attention especially in the face of the excellence movement, surface:

1. To what extent does success in the highly individual processes of reading and communicating depend on how students learn, and
2. Which elements of learning style are the most influential to reading and communicating success?

This paper reports findings from several statistical analyses designed to answer the questions cited above.

For the purposes of this study, learning style is defined as an individual's preference for certain environment, emotional, physical, and psychological factors related to the learning process, in short, the way an individual learns best. Success in reading and communication can be defined in many ways, but for the sake of statistical analysis, is defined as the level of competence demonstrated by the Comprehensive Test of Basic Skills (CTBS).

## SIGNIFICANCE OF STUDY

It comes as no revelation to teachers that students are different from each other. Some are tall, some short; some are white, some black, or brown. Some can sit quietly and work; some must have noise to learn. Some grasp material better when it is presented in a multi-media arrangement; some prefer only the text and a well-lighted desk area. Some need adult supervision and praise; others respond better to peer approval and attention. These obvious differences are parts of a student's individual learning style, his or her method of perceiving, accepting, processing, and using information. Currently consisting of 21 elements, the learning style is influential, if not critical, in determining whether a student can or will succeed in school. These elements include environmental conditions (sound, light, temperature, and classroom design), emotional conditions (motivation, persistence, responsibility, and assignment structure), sociological conditions (peers, self, pair, team, adult, and varied), physical conditions (perceptual, intake, time, and mobility), and psychological (analytic - vs - global, hemispheric preference, and impulsive - vs - reflective) (Dunn, 1982).

The identification of personal learning style and prescription of subsequent teaching/learning activities based on learning style of students have been affirmed in the literature. Since the introduction and design of the Learning Style Inventory (Dunn and Dunn, 1978), repeated studies have validated initial results: teaching and learning are significantly more effective when learning activities are matched to learning style (Urbschat, 1977).

Learning style has been shown to be individual and consistent over time and over subject matter (Copenhaver, 1979). This consistence has led to longitudinal studies showing grade point averages in secondary

schools to be higher if students are allowed to learn in matched situations (Cafferty, 1980). Not only have general achievement scores been advanced, specific subject fields have been more effectively taught addressing the individual nature of a student's learning style. Reading and math scores have been substantially increased (Wheeler, 1980, and Dunn, et al. 1981). Low achievers have demonstrated increased performance in learning situations involving multi-sensory resourses (Dunn, 1981).

Further research has indicated an increase in positive learning attitude when students are made aware of their learning styles (Domino, 1970 and Martin, 1977). Many students can predict the results of the Learning Style Inventory by what they already know of themselves and the way they learn. Confirmation of their self-knowledge from the Learning Style Inventory is personally positive and reinforcing (Farr, 1971). This positve learning attitude is further evident in the resulting reduction of discipline problems and truancy (Lynch, 1981).

## HYPOTHESES

From the original questions posed in the introduction, and the conclusions drawn from research literature, these hypotheses emerged:

$H_1$ Individual learning style contributes significantly to reading and communication skills.

$H_2$ Specific learning style elements acting together account for a significant amount of variance in reading and communicating skills.

From data available to the study, this final null hypothesis was formed:

$H_3$ There are no significant differences between sexes, races, and socioeconomic levels in the preferences for learning style elements.

## METHOD

A subject group of over one thousand students provided data base for statistical analysis. The researchers did not initially seek that large a group, but were pleased when every appropriate campus administrator in the local school district wanted to contribute.

Students tested were in eighth grade during the 1982-1983 school year. Eighth grade students were selected because they could take the testing instruments independently, they were accessible through their required English classes and standardized testing of eighth grade classes was already a practice in the school district.

The learning style instrument used was the Learning Style Inventory (Dunn and Dunn, 1978), administered on each campus during the students' regularly scheduled English classes on a day selected by consensus of the teachers involved. Individual scores indicated each student's preference for the item within the range of twenty to eighty.

Reading and Language Arts competencies were measured by the Comprehensive Test of Basic Skills (CTBS), a standardized instrument regularly used in district-wide measurement. Both these instruments were administered under the district policy allowing such testing to assess student learning.

Other data collected from information on enrollment cards were the sex and race of each student. Finally the socioeconomic level was determined by dividing participants in three areas, identified by free and reduced lunch lists. Those students not listed, and thus paying full prices were a group, those paying reduced prices were another, and those receiving free lunch were the third group. This method proved to be the only reliable way to gather such information without awkward and possibly inappropriate questionnaires.

## DATA ANALYSIS

Several statistical treatments were applied to the data to explore questions implied in the hypotheses. $H_1$ and $H_2$, considering the effect of learning style generally and individual elements specifically, were both addressed by Multiple Regression analysis. Results are cited in Summary Tables 1 (Reading) and 2 (Language Arts).

Levels indicate that individual learning style accounts for 16% of the variance in reading and language arts skills. This level is highly significant ($P \leq .001$); thus $H_1$ that learning style accounts for a significant amount of reading and communicating skills variance is accepted.

$H_2$ sought to identify which specific elements, and in what order, contributed significantly to the skills tested. Findings are available in Tables 1 and 2. For both skills the same learning style elements were in the top four listed. For reading skills, the most critical elements, in order, were persistent, adult motivated, authority figures not present, and requires intake.

For language arts skills, the same four elements were identified as the most critical, but in a slightly different order; persistent,

MULTIPLE REGRESSION

SUMMARY TABLE

| VARIABLE | SIGNIFICANCE | MULTIPLE R | R SQUARE | SIMPLE R | OVERALL F |
|---|---|---|---|---|---|
| Persistent | .000 | .20237 | .04095 | .20237 | 44.79518* |
| Adult Motivated | .000 | .25324 | .06413 | .18115 | 35.90586* |
| Authority Figures Present | .000 | .29090 | .08462 | -.15318 | 32.26391* |
| Requires Intake | .000 | .32029 | .10259 | .13278 | 29.89279* |
| Auditory | .000 | .33799 | .11424 | -.09512 | 26.95537* |
| Afternoon | .001 | .35230 | .12411 | -.09013 | 24.65612* |
| Noise | .033 | .35769 | .12794 | .08613 | 21.86027* |
| Needs Mobility | .038 | .36269 | .13154 | -.05995 | 19.72895* |
| Evening-Morning | .039 | .36755 | .13509 | -.07170 | 18.06610* |
| Temperature | .055 | .37167 | .13814 | -.04904 | 16.66888 |
| Kinesthetic | .065 | .37544 | .14096 | .05778 | 15.49887 |
| Tactile | .023 | .38112 | .14525 | -.04136 | 14.69976 |
| Design | .083 | .38437 | .14774 | -.08734 | 13.82778 |
| Learning Alone | .083 | .38757 | .15021 | .04942 | 13.08013 |
| Structure | .115 | .39018 | .15224 | -.09058 | 12.39111 |
| Motivation | .208 | .39184 | .15354 | .09857 | 11.72222 |
| Late Morning | .244 | .39326 | .15465 | -.09185 | 11.11662 |
| Learn in Several Ways | .398 | .39400 | .15524 | -.06593 | 10.53586 |
| Peer Oriented | .279 | .39522 | .15620 | -.02648 | 10.04475 |
| Responsible | .490 | .39571 | .15659 | .09862 | 9.56150 |
| Teacher Motivated | .649 | .39593 | .15676 | .03053 | 9.10907 |
| Light | .892 | .39595 | .15677 | -.01781 | 8.68757 |

TABLE 1: Multiple Regression of Independent Learning Style Variables to Dependent Reading Variable.

*P ≤ .05

MULTIPLE REGRESSION

SUMMARY TABLE

| VARIABLE | SIGNIFICANCE | MULTIPLE R | R SQUARE | SIMPLE R | OVERALL F |
|---|---|---|---|---|---|
| Persistent | .000 | .23087 | .05330 | .23087 | 59.06233* |
| Requires Intake | .000 | .29099 | .08468 | .16744 | 48.47544* |
| Adult Motivated | .000 | .31493 | .09918 | .15891 | 38.42486* |
| Authority Figures Present | .000 | .33524 | .11238 | -.12816 | 33.10950* |
| Late Morning | .001 | .34831 | .12132 | -.12903 | 28.85613* |
| Responsible | .014 | .35553 | .12640 | .12250 | 25.17583* |
| Afternoon | .019 | .36196 | .13101 | -.05356 | 22.46381* |
| Motivation | .016 | .36857 | .13584 | .12849 | 20.47499* |
| Evening-Morning | .014 | .37526 | .14082 | -.09790 | 18.95807* |
| Tactile | .035 | .38012 | .14449 | -.06034 | 17.56515* |
| Kinesthetic | .007 | .38800 | .15054 | .07425 | 16.73946* |
| Needs Mobility | .040 | .39241 | .15399 | -.06959 | 15.74410* |
| Temperature | .055 | .39622 | .15699 | -.03860 | 14.85499 |
| Noise | .134 | .39851 | .15881 | .05698 | 13.97093 |
| Learning Alone | .158 | .40054 | .16043 | .04234 | 13.18504 |
| Teacher Motivated | .196 | .40223 | .16179 | .09845 | 12.47364 |
| Learn in Several Ways | .288 | .40337 | .16270 | .00669 | 11.80783 |
| Auditory | .340 | .40428 | .16344 | -.02261 | 11.20155 |
| Design | .401 | .40499 | .16402 | -.07640 | 10.64614 |
| Structure | .473 | .40550 | .16443 | -.05668 | 10.13484 |
| Peer Oriented | .703 | .40565 | .16455 | -.02442 | 9.65112 |
| Visual | .876 | .40567 | .16445 | -.03381 | 9.20481 |

TABLE 2: Multiple Regression of Independent Learning Style Variables to Dependent Language Arts Variable.

*$P \leq .05$

intake, adult motivated, and authority figures not present. A total of nine elements proved to be significant factors in reading; a total of twelve elements were significant in language arts. These are listed in descending order of significance on Tables 1 and 2.

The last hypothesis suggested that no differences exist in learning styles between sexes and among three races and three socioeconomic groups. This hypothesis was rejected because of the many instances of significant differences in the groups identified.

ONEWAY analysis was conducted on each of the twenty-three elements comparing learning styles of boys and girls. Thirteen of the twenty-three elements were significantly different between the sexes. Girls demonstrated a significantly greater need for warmer temperatures, were more motivated, persistent, responsible and peer oriented than boys. Further they showed more need to learn in several ways, were auditory, required intake, were afternoon learners and were more adult and teacher motivated than boys ($P \leq .05$). Boys showed greater need for design, were more tactile than girls ($P \leq .05$). The remaining ten elements did not show significant differences between boys and girls. Complete findings are on Table 3.

The three races identified were Caucasian, Black and Hispanic. Ten of the twenty-three elements proved to be significantly different among the three groups. Caucasian and Black student learning styles demonstrated more persistence than Hispanic students. Black students were more structure oriented, more visual and preferred late morning. Hispanic and Black students needed more design than Caucasian and required less intake. Caucasians wanted less structure, more intake and were more adult motivated. Complete results are noted in Table 4.

ONEWAY

SUMMARY TABLE

| ELEMENT | $\overline{X}$ BOYS N=523 | $\overline{X}$ GIRLS N=527 | PROBABILITY |
|---|---|---|---|
| Temperature | 49.01 | 51.18 | .0097 |
| Design | 46.28 | 41.16 | .0001 |
| Motivation | 49.46 | 54.20 | .0000 |
| Persistent | 47.07 | 49.60 | .0003 |
| Responsible | 40.32 | 43.69 | .0063 |
| Peer Oriented | 45.59 | 49.03 | .0022 |
| Learn in Several Ways | 42.23 | 48.38 | .0000 |
| Auditory | 50.10 | 53.26 | .0000 |
| Tactile | 49.02 | 45.02 | .0000 |
| Require Intake | 50.63 | 52.99 | .0201 |
| Afternoon | 46.23 | 51.55 | .0000 |
| Adult Motivated | 52.43 | 55.45 | .0068 |
| Teacher Motivated | 46.61 | 52.35 | .0000 |

TABLE 3: ONEWAY Analysis of Significantly Different Means of Learning Style Elements Between Boys and Girls

$P \leq .05$

ONEWAY

SUMMARY TABLE

| ELEMENT | CAUCASIAN (N=774) | BLACK (N=89) | HISPANIC (N=188) | PROBABILITY |
|---|---|---|---|---|
| Design | 42.53* | 47.97 | 46.56 | .0094 |
| Motivated | 51.48 | 55.76* | 51.51 | .0140 |
| Persistent | 49.40 | 48.34 | 43.92* | .0000 |
| Responsible | 42.09 | 46.60* | 39.60 | .0242 |
| Structure | 43.53* | 50.31* | 46.96* | .0024 |
| Visual | 50.23 | 54.43* | 50.62 | .0188 |
| Intake | 53.41* | 47.74 | 46.90 | .0000 |
| Evening - Morning | 45.13* | 48.64 | 47.12 | .0108 |
| Late Morning | 16.19* | 25.94* | 20.38* | .0001 |
| Adult Motivated | 55.58 | 53.26 | 47.55* | .0000 |

TABLE 4: ONEWAY Analysis of Significantly Different Means of Learning Style Elements Among Three Racial Groups

*Significantly Different Means

Means underlined are not significantly different.

$P \leq .05$

ONEWAY

SUMMARY TABLE

| ELEMENT | FULL LUNCH PRICE (N=825) | REDUCED LUNCH PRICE (N=79) | FREE LUNCH (N=146) | PROBABILITY |
|---|---|---|---|---|
| Noise | 46.14* | 43.80* | 40.68* | .0463 |
| Design | 42.60 | 44.96 | 49.58* | .0011 |
| Visual | 50.19 | 53.62* | 51.73 | .0535 |
| Tactile | 46.45* | 50.40 | 48.30 | .0378 |
| Intake | 52.55 | 50.97 | 47.71* | .0043 |
| Evening - Morning | 45.36 | 48.73* | 46.67 | .0449 |
| Afternoon | 48.07* | 53.39 | 51.03 | .0164 |
| Adult Motivated | 55.42* | 48.61 | 48.49 | .0000 |

TABLE 5: ONEWAY Analysis of Significantly Different Means of Learning Style Elements Among Three Socio-economic Levels

*Significantly Different Means

Means underlined are not significantly different.

$P \leq .05$

Socioeconomic levels were labeled one, two, and three, based on the only reliable data available, price paid by student for lunch, either full, or reduced, or free. While it is obvious that many additional divisions occur, the researchers opted for these three. Eight elements indicated significant differences in preference among the three groups. All three were significantly different from each other in need for noise (group one highest), for design (group three highest), and for tactile experiences (group three highest). Group two was more visual than one and three, group one more adult motivated and group three needed more intake. Complete results are noted in Table 5.

Researchers rejected the null hypothesis that no differences in learning style exist between sexes, among races, and socioeconomic groups.

## CONCLUSIONS

Findings from reliable tests and a substantial N are important: a significant part of a student's ability to read and to use language arts skills is dependent on his or her learning style. Further, boys and girls demonstrate real differences in learning style preferences, as do Caucasians, Blacks, and Hispanics, as well as students compared by their socioeconomic level.

These results should bear serious implications for educators facing the challenges of teaching all children to read and communicate, not just the ones whose learning styles are condusive to such activities. Diversity is a unique positive component in American education; students should not feel negative results as its by-product.

Repeated instances in the literature describe significant

increases in student performance when learning activities allowed for variation in learning style. The critical differences in styles between and among identified groups and the relationships noted in learning style elements with reading and language arts support the need for such studies and more like them in the future.

Other concerns that could be addressed by research include:

1. Interactive differences between variables of sex, race, and socioeconomic level. (e.g. Do Caucasian males in low socioeconomic groups show a different learning style preference than Caucasian females in the same group?)
2. Which learning styles are more condusive to standardized testing and which respond better to non-conventional measurement?
3. Are learning styles constant among like groups living in different parts of the country? (e.g. urban-rural, regional differences, demographic ratio differences.)
4. Does birth order affect learning style? (Related topics: siblings, number, birth order, and sex.)
5. Are learning styles hereditary? Do children usually match their parents' preferences?

It should not be discouraging to the reader that this and most other research raise more questions than they answer. (Persistence is evident in the learning style of both researchers.) What is important, however, is the significant role that learning style contributes to reading and language arts. Finally, differences in sex, race, and socioeconomic levels produce different preferences for

learning.

These observed differences confirm conclusions in the literature and what many teachers already know: that each student is unique, processing information in his or her own way, that some learning styles contribute to identified academic skills more than others, and that individual demographics influence the way a student learns best. Findings here are positive confirmation of the dynamics in American education, to allow every child full access to learning acknowledging his or her distinctly individual paths to competency.

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APPENDIX

1. Learning Style Elements

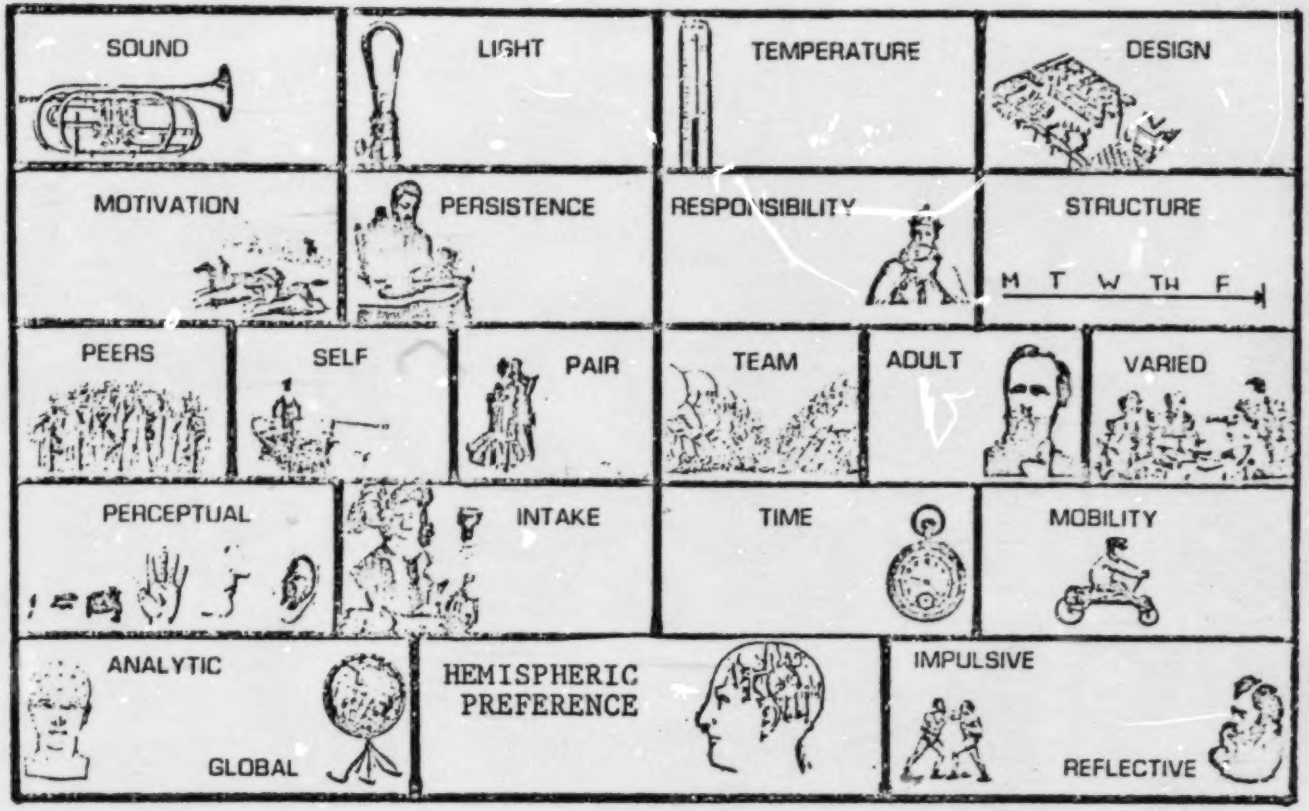
2. Description

3. Sample Profile

# DIAGNOSING LEARNING STYLES

## STIMULI

## ELEMENTS




DESIGNED BY: RITA DUNN
KENNETH DUNN

## LEARNING STYLE INVENTORY

The Learning Style Inventory (LSI), based on factor analysis, is the first comprehensive approach to the diagnosis of an individual's learning style. This instrument, a useful tool in analyzing the conditions under which students prefer to learn, assesses individual preferences in the following areas: (a) immediate environment (sound, heat, light and design); (b) emotionality (motivation, responsibility, persistence and structure); (c) sociological needs (self oriented, peer oriented, adult oriented or combined ways); and (d) physical needs (perceptual perference(s), time of day, food intake and mobility).

The Learning Style Inventory will:* Permit students to identify how they prefer to learn and will also indicate the degree to which their responses are consistent. *Provide a computerized summary of each student's preferred learning style. *Provide a basis for the teacher/student interaction in the way(s) that each student learns best. *Provide suggested strategies for instructional and environmental alternatives to complement the student's revealed learning style. *Provide for appropriate student involvement in their unique learning prescriptions. *Provide a computerized class summary so that teachers can group students with similar learning style elements.

The LSI has dichotomous items and can be completed by students in grades three through twelve in approximately thirty minutes.

## SAMPLE ITEMS

I study best when it is quiet.
I concentrate best when I feel cool.
I have to be reminded often to do something.
I really like to mold things with my hands.
It's hard for me to sit in one place for a long time.
I do better if I know my work is going to be checked.
Nobody really cares if I do well in school.
I study best at a table or desk.
The things I remember best are the things I read.
I try to finish what I start.
I hardly ever finish all my work.
I can ignore most sound when I study.
I like to study by myself.
The things I remember best are the things I hear.
I really like to draw, color, or trace things.
When I can, I do my homework in the afternoon.

The computerized results of the LSI are available in three forms depending on which option(s) is/are requested by the user. The options are described in the following sections.

(Dunn and Dunn, 1978)

# INDIVIDUAL PROFILE

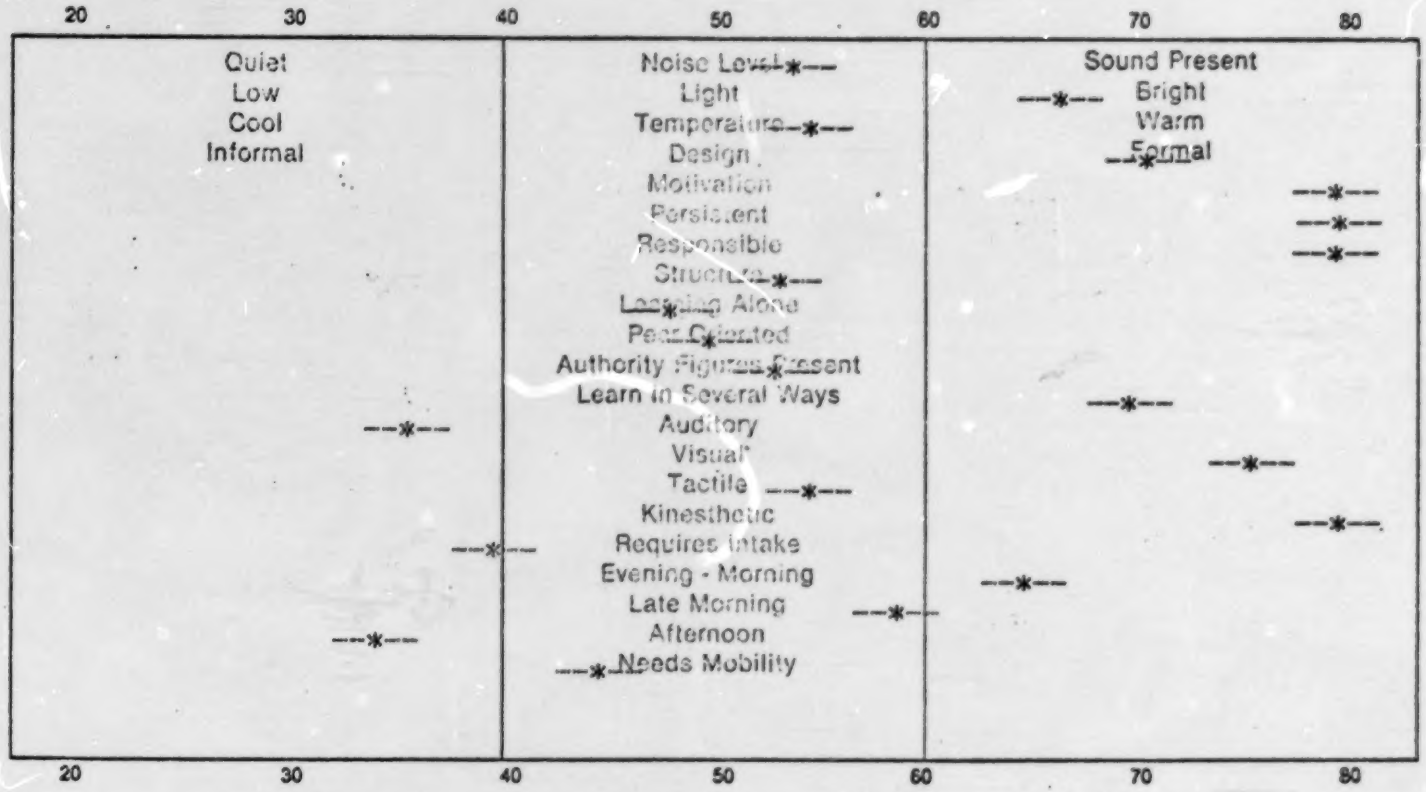
## PRODUCTIVITY ENVIRONMENTAL PREFERENCE SURVEY

Name: DUDLEY PATSY  Sex: F  Year in School: 16  Date of Birth: 32 / 12 (Yr./Mo.)  I.D. No.: 466409058

Group Identification: TASCD T EXAS  Special Code:  Date: 06-04-1982  Group No.: 443

## PREFERENCE SUMMARY

| Raw Score | Standard Score |
|---|---|
| 1 | 54 |
| 2 | 67 |
| 2 | 55 |
| 2 | 71 |
| 2 | 80 |
| 2 | 80 |
| 3 | 80 |
| 8 | 53 |
| 6 | 48 |
| 1 | 50 |
| 1 | 53 |
| 1 | 70 |
| 8 | 36 |
| 2 | 76 |
| 1 | 55 |
| 1 | 80 |
| 1 | 40 |
| 3 | 65 |
| 1 | 59 |
| 6 | 34 |
| 1 | 45 |



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